NEWSLETTER

PRIVATE CIRCULATION VOLUME 14 NUMBER 1 WINTER 1976

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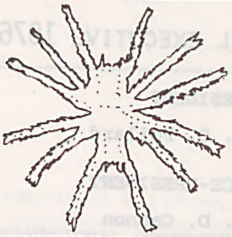

AUSTRALIAN SOCIETY FOR LIMNOLOGY

NEWSLETTER

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THE NEWSLETTER IS NOT A FORMAL PUBLICATION AND ANY MATERIAL IN IT SHOULD NOT BE CITED WITHOUT PERMISSION OF THE AUTHOR(S) CONCERNED

THE AUSTRALIAN SOCIETY FOR LIMNOLOGY

The Australian Society for Limnology is an association of over 200 people with professional or amateur interests relating to Australian inland waters. Since its inception in 1961, the Society has played an important role in fostering limnological work in this country. The ASL also promotes liaison between limnologists in academic, private, and governmental institutions, and has a vested interest in the conservation of aquatic and related resources. Annual congresses are held near centres of limnological interest, and the program includes scientific sessions, field excursions, and social activities.

The ASL produces a Newsletter, with notes on activities, articles of general interest, book reviews, and congress anouncements, and an occasional Special Publication. A further periodical publication is the Directory of Australian Limnologists.

Membership applications are welcomed; four classes of subscribing membership are catered for:

- Ordinary members ($8 pa)
- Student members ($4 pa)
- Sustaining members ($50 pa or more)
- Affiliated Bodies (subs. on application)

NOTE: Members are entitled to receive the *Aust. J. mar. Freshwat. Res.* at a reduced rate ($4).

Subscriptions cover the period 1 July-30 June.

Details are available from:

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* * * * *

Newsletter contributions are always welcome, and correspondence should be addressed to the Newsletter Editor. The next copy deadline is October 31, 1976.

STOP PRESS

INTERNATIONAL CONFERENCE OF THE INTERNATIONAL ASSOCIATION OF WATER POLLUTION RESEARCH

There are still places available on the Post-Conference Continuing Education course (details below). Thus, if you are a biologist/engineer/chemist/bacteriologist in this field and feel you don't know enough (who does?) write post-haste to Mr. Povey, State Rivers and Water Supply Commission, 590 Orrong Road, Armadale, Victoria. The registration fee is $75. Information may also be obtained from:

Professor J.D. Lawson,
Department of Civil Engineering,
University of Melbourne,
PARKVILLE, Vic. 3052.

OUTLINE OF COURSES

NOTE:

i. All Courseswill be conducted in the English language.
ii. Course A & B will be held concurrently, October 23 through 24. Courses C & D will be held concurrently; Course C on October 25, Course D October 25 through 26.
iii. Courses will commence each day at 9.00 a.m. at the Department of Civil Engineering, University of Melbourne.
iv. The list of lecturers may be admended.

COURSE A TREATMENT AND DISPOSAL OF WASTE WATER BY LOW COST METHODS

Course Leader - Prof. H. Shuval (Israel), Mr. C.D. Parker (Australia).

General, recent information about the topics, mainly addressed to sanitary engineers, public health officials from less industrialised countries where highly sophisticated systems cannot be recommended.

1. Public Health Aspects
   Prof. H. Shuval (Israel)
2. Septic Tanks, Imhoff Tanks, Sedimentation
   Mr. K. Imhoff (West Germany)
3. Lagoons
   Prof. G. Shelef (Israel)
4. Aerated Lagoons, Oxidation Ditches
   Dr. C. Adams (U.S.A.)
5. Biofiltration
   Dr. Ouano
6. Irrigation
   Mr. W. Kirby (Australia)
7. Industrial Wastes
   Dr. S.H. Jenkins
   Mr. R. Chalmers (U.K.)

8. Sludge Disposal
   Dr. P. Benedek (Hungary)

COURSE B UNIT PROCESSES IN WASTE WATER TREATMENT

Course Leader - Dr. C. Adams (U.S.A.)

Addressed to sanitary engineers and scientists of all countries interested in comprehensive information and discussion about the recent development in the main topics of waste water and sludge treatment.

1. Waste Characterisation, Analytical and Monitoring Techniques
   Dr. C. Fisher (Canada)
2. Pre-Treatment Consideration I (Sedimentation, Coagulation, Flotation)
   Dr. C. Adams (U.S.A.)
3. Pre-Treatment Consideration II (Equalisation, Neutralisation, Oxidation, Ion Exchange, Water Circuits and Reuse).
   Dr. A. Downing (U.K.)

4 & 5. Aerated Lagoons, Activated Sludge (including Biological Denitrification, Simultaneous P-Removal, Aeration)
   Prof. W. Eckenfelder (U.S.A.)
   Prof. W.V.D. Emde (Austria)

6. Biofiltration
   Prof. G. Rincke (W. Germany)
7. Anaerobic Treatment
   Prof. J. Malina (U.S.A.)
8. Sludge Dewatering & Disposal
   Prof. J. Malina (U.S.A.)

COURSE C ADVANCED TREATMENT

Course Leader - Dr. D. Ford (U.S.A.)

More specialised course, reports and exchange of experiences in the field of advanced treatment, including results of practically operated plants.

1. Filtration
   Dr. L.R.J. van Wuuren (S. Africa)
2. Carbon Absorption
   Dr. G. Ford (U.S.A.)
3. Coagulation and P-Removal
   Dr. Schmidtke (W. Germany)
4. Demineralisation
   Mr. E.A. Swinton (Australia)

COURSE D BIOLOGICAL MONITORING

Course Leader - Professor W.D. Williams (Australia)

Instruction course for biologists involved in environmental areas and appreciation by engineers and administrators of this topic.

1. The Concept and Scope
   Dr. Cairns (U.S.A.)
2. Biological Principles and Considerations
   Dr. J.M. Leach (Canada)
3. Practical Procedures and Techniques
   Mr. W.S.G. Morgan (South Africa)
4. Australia and International Applications
   Prof. W.D. Williams (Australia)

5. Interpretation and Assessment
   Dr. W. Schmitz (W. Germany)
6. Biological Monitoring and the Administration
   Dr. J.S. Slade (U.K.)
   Mr. H. Fish (U.K.)

* * * * *

DR. EDGAR RIEK:-

Dr. E.F. Riek, formerly of the Division of Entomology, C.S.I.R.O., has recently retired. Dr. Riek has contributed much and over a long period to the knowledge of Australian inland waters and all members of the Society will wish him well in his retirement.

DR. J.L. BARNARD:-

Dr. J.L. Barnard, THE amphipod taxonomist is spending three months (August - October 1976) working at the Fisheries Department, Flinders Street Extension, Melbourne. Have a nice stay Jerry!

DR. I.A.E. BAYLY:-

Dr. I.A.E. Bayly has informed the National Representative for SIL that he proposes NURIOOTPA, S.A., as the venue for the next SIL Conference. He does so on the grounds that locomotive No. 217 (Rx class) is stuffed in a small roadside park there.

NEWTS:-

As many of you will know, there was recently a small furore in South Australia after it was discovered that exotic newts were on public sale at a number of Adelaide Department stores. Public interest reached such a peak that even the ABC announcers began to take an interest. One, Ian Beatty, made a rather awful joke about the matter and thus provoked the following reply:

My dear Beatty,

Each Wednesday night
Long moans evoke
From those afore the telly,
For that's the time
When Beatty's jokes
Gets upon our Nelly.

There's some that's bad,
And some that's worse,
And somes that make one puke
But last night' effort
Must take the cake -
I refer to the one about newts.

They've done no harm,
'Tis said by many,
But say that, they shouldn't oughta,
For home for them,
Is not near here,
It's in some other waters.

So, newtritious or not,
Be warned what you've got,
And get rid of the little bastards before
they kills your grandmothers takes
over the government and invites
Nixon for president.

Yours sincerely,

An eminent zoologist.

* * * * *

WHO IS THIS GUY?

Recently a card was posted from Adelaide (27.8.76) to Mr. J.C.H. Wharton, Fisheries and Wildlife Division, 632 Bourke Street, Melbourne, Victoria, 3000. It was returned to the sender, Buckney, Zoology, overmarked "Left Address, Unclaimed, Return to Sender".

ARTICLES

THE INAUGURAL HILARY JOLLY MEMORIAL LECTURE

HILARY JOLLY: AN APPRAISAL OF THE WOMAN AND OF HER CONTRIBUTION TO AUSTRALASIAN LIMNOLOGY*

by Ian A.E. Bayly

(Department of Zoology, Monash University)

Violet Hilary Jolly, "Vi" or more usually "Hilary" as she was known to her friends and colleagues, was born in New Zealand in 1906.

Not only did she have a very colourful personality, as all of us who knew her are well aware, but she also had an extremely colourful and varied life - far more so, I might add, than most conventionally trained limnologists whether academic or applied.

Hilary Jolly was born in Hamilton to a well-known pioneering family. The Hamilton suburb and railway junction known as Frankton was named for Frank Jolly, Hilary's father. It is interesting that the place name was derived from his first name rather than his surname. This suggests to me (but I admit to not having researched the matter) that he was not only a widely known identity but also a much liked, informal, and friendly person. Certainly, if Hilary's personality had been largely shaped by paternal genes, he must have been a very warm-hearted man indeed.

I have been unable to obtain information on Hilary's childhood or on her mother. However, she attended Hamilton Girls' High School and after leaving she trained as a "dental nurse". By this I do not mean a male dentist's assistant but an actively practising female dentist tending mainly to dental caries in school children - a real live female dentist, if you like. Such a profession is well known and highly valued in New Zealand but is scarcely heard of in more socially backward (and male chauvinist?) countries like Australia.

Some of Hilary's exploits in the long pre-limnology phase of her life are almost legendary. They include her riding a horse, as white as her own hair was in later life, through the Ureweras - that thickly bushed country surrounding Lake Waikaremoana (a lake which Hilary later studied limnologically). This is wild country into which the famous Maori chief Te Kooti retreated after clashes with the infamous pakeha. [Actually, at school (Omata Primary School) I

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* Paper presented at the XV Congress of the Australian Society for Limnology, Tanunda, S.A.

believe it was taught to me the other way round!] In preparing this talk I decided to look up Te Kooti in a recent reference book and I was astonished to read "his name lives on - and in the thick forest of the Urewera, his haunt and refuge, he is STILL [my emphasis] a brooding presence.". Clearly, then, Hilary rode her white horse through this country in the presence of Te Kooti. Perhaps, if time heals all, he even watched over her.

During the 1930's she rode a motor bike around the countryside - hardly a common sight in those days! [She did not, as far as I can discover, ride a motor bike around the shores of lakes like my friend Tyler!] Also in the 1930's she went to China and, in fact, was there at the outbreak of the Sino-Japanese war in 1937 when she had some narrow escapes from arrest if not death for suspected spying! However, she managed to leave China and was in Australia at the outbreak of the Second World War.

Scientific Career

Hilary Jolly did not embark upon university studies until after the Second World War when she was more than 40 years old. She did her first year studies at Auckland University College (as it was then) and then went to Otago University where she continued in science majoring in botany and zoology. She took out an M.Sc. in 1955 with a thesis on Cladocera.

With respect to her decision to specialize in limnology, Hilary was greatly influenced and inspired by a talk she heard given by the late Professor Edward Percival of Canterbury University. Percival, it may be noted, was very interested in New Zealand lakes, more especially those in the South Island, and published a number of papers on lacustrine biology including planktonic Crustacea.

After completing her M.Sc., Hilary travelled to the U.K. where she worked for a time at the Ferry House on Windermere and gained considerable experience in planktonology.

Upon return to New Zealand she commenced study for a Ph.D. This involved a comparative study of the limnology of some 23 New Zealand lakes ranging from the Rotorua lakes in the north to Lake Manapouri in the south. Apart from travel assistance from the Internal Affairs Department, Hilary financed this extensive work herself.

Her Ph.D. was submitted in 1959, and there is a rather bizarre story to be told about this event. Apparently it was then the practice in New Zealand for Ph.D. candidates to have an oral examination as a matter of course. In Hilary's case the examiner was to have been Professor Percival, the man who originally inspired her to become a limnologist. When the day arrived for the scheduled examination Hilary was informed that Professor Percival had died that morning. Subsequently it was K. Radway Allen who carried out the examination.

There were, I think, three main themes in Hilary's limnological research: the taxonomy of planktonic crustaceans, the vertical migratory behaviour of zooplankton, and the physics and chemistry of lakes. There are only two papers that come to mind as lying outside these areas; these were her 1967 paper on the smelt *Retropinna lacustris* in Lakes Rotorua and Taupo, and her 1966 joint paper with Ann Chapman on river pollution in New South Wales. It should be noted that, despite the abundance of organically polluted rivers in Australia, the latter paper still represents one of a very few published studies of them.

Hilary's first limnological paper was published in 1952. It dealt mainly with the plankton and physico-chemical features of a New Zealand lake, Lake Hayes, yet was published in the Australian Journal of Marine and Freshwater Research. With respect to her last paper, I suspect that we are still to see it as Ann Chapman mentioned in a letter that I received early this year that she (Ann) had helped Hilary finish two papers in hospital shortly before her death.

What was Hilary's most valuable contribution to Australasian limnological literature? In my view it was her studies on the physico-chemical features of New Zealand lakes and especially their thermal behaviour and patterns of mixing. Leaving aside her book, which I shall refer to later, I think that Hilary Jolly's *maxim opus* was her 1968 paper entitled "The Comparative Limnology of some New Zealand Lakes. I. Physical and Chemical." In this area she was not merely duplicating earlier northern hemisphere work, for the lakes she studied differed considerably in behaviour from those associated with large land masses in Europe and North America. Thus several of her lakes that underwent stratification had much deeper thermoclines than those of comparable area and latitude in the northern hemisphere. In Lake Wakatipu, for example, the thermocline varied in depth from 55 to 150 metre. Likewise her finding that Lake Rotorua (lat. 38°S., altitude 278 m, $\bar{z}$ = 11 m, z_m = 36 m) was polymictic clearly demonstrated that, in the southern hemisphere at least, such lakes, even if relatively deep, may occur well outside the altitudinal and latitudinal ranges indicated by Hutchinson and Löffler in their 1956 paper. The latter authors implied that polymictic lakes occur only in the tropics and especially in shallow lakes or those at high altitudes.

Still other New Zealand lakes (but not ones that Hilary studied at all intensively) showed an annual cycle of mixing that was not accommodated by any existing classification. The latter were formally designated by Bill Williams and me in our book as warm thereimictic lakes. Such lakes freeze over in winter and circulate completely in summer at a temperature considerably above 4°C. Although Hilary did not assign such lakes a formal category she was aware of their existence.

Role in the Formation and Nurture of the Australian Society for Limnology

In 1959 Hilary left New Zealand to take up the position of biologist with the Sydney Metropolitan Water, Sewage and Drainage Board. She was, in fact, the first biologist employed by that Board. Her main duties were to monitor conditions in the various reservoirs servicing the Sydney area.

Hilary played a major role in the establishment of the Australian Society for Limnology. In 1961 she suggested to John Lake and Jim Wharton that the time had come for some such society to be formed.

Shortly after my offering to speak on Hilary Jolly I consulted an old file labelled "Australian Society for Limnology". In it I found a hand-written letter dated 28 September 1961 on paper headed "[Sydney] Metropolitan Water Sewage & Drainage Board, Warragamba Dam, Biological Laboratory". At that time I was on the staff of the Zoology Department, University of Queensland. The letter read, in part, as follows:

"Dear Mr. Bayly,

I enclose 2 drafts of the letter being sent out to anybody who might be interested in [the] proposed freshwater association ....

Hoping to see you on the 21st [of October 1961].

Sincerely,

(signed) Hilary Jolly"

It may be noted that the first of the two mimeographed circulars enclosed with Hilary's personal letter was signed by V.H. Jolly and J.S. Lake as convenors for New South Wales and the second was signed by J.C.F. Wharton as convenor for Tasmania, Victoria, South Australia and Western Australia. Both of these circulars summoned people interested in the formation of an Australian freshwater association to attend a meeting to be held at the Australian National University, Canberra, on 21 October 1961. It was as a result of this meeting, which was chaired by Professor J.D. Smyth, that the Australian Society for Limnology ultimately came into existence.

After this initial Canberra gathering a further meeting of a sort of steering committee took place at Hilary's home territory, i.e. Warragamba Dam, on 20 January 1962. The inaugural meeting of the Australian Society for Limnology, as formally constituted, took place at Monash University in May 1962. Hilary Jolly was a member of the first Executive Committee. Subsequently she held the offices of Vice-President (1964-1965) and President (1968-1969). In 1970 Hilary was made the first Honorary Life Member of the A.S.L.

Although Hilary Jolly returned to New Zealand in 1969 her intense interest in the A.S.L. continued. In early 1971 she generously donated to the Society a considerable sum of money. It was ultimately resolved in 1973 that this fund should be used for an award (in the form of an inscribed book), to be known as the Hilary Jolly Award, which may be given to individuals who have made a significant contribution to any aspect of Limnology in Australia. The first recipient of this award (for 1973/1974) was Professor Allan Weatherley. I am very proud indeed to have been chosen as the second recipient (for 1974/1975).

Hilary's Last Years - Home again in New Zealand

Although Hilary's return to New Zealand in 1969 was supposed to signal her retirement, in fact she launched herself into an active phase of research. Using Auckland University as a base she joined a team from the Freshwater Section of D.S.I.R. (when are we going to get a freshwater sections in C.S.I.R.O.?) in an intensive study of some of the Rotorua lakes. Hilary took charge of the zooplankton while Dr. Flint worked the phytoplankton and Bob McColl and Don Forsyth studied the chemistry and benthos respectively. Hilary also continued to work on cladocerans at the university.

Hilary's last major work was the book on New Zealand lakes which she edited jointly with Dr. John Brown. Although the editorial work had been completed for some long time when she died, Hiliary did not live to see it in print. I have yet to see a copy (publication was scheduled for December

1975), but I have no doubt that this work will be one of her more lasting monuments.

Hilary died on 30 October 1975 at the age of 71 after a fairly brief illness (carcinoma of the liver). You will remember that earlier I alluded to the fact that she was still writing limnology papers on her death-bed.

A tribute to her in a recent newsletter of the New Zealand Ecological Society read, in part " .... this suspected 70-year-old kept herself and her younger associates in the field in all weathers. Her good humour, good company and vigorous personality will be missed by all who knew her.". I, personally, will miss her greatly and her death makes the Australian Society for Limnology much the poorer.

Acknowledgement

I am indebted to Dr. Ann Chapman, University of Waikato, for supplying me with information about the early stages of Hilary's career.

Epilogue

I have tended to speak above about Hilary Jolly's career and entry into the ranks of professional limnology as if it were a curious oddity. But is it? Perhaps, instead, she has shown us the best way of doing things.

As a university teacher of some 16 years' standing, it has been my experience that the small minority of students who are well above the class mean in age are usually outstandingly good students.

It seems to me that with respect to learning, society is presently organized in such a way that we make the most intensive demands upon people when biologically they are least capable of withstanding it. A study of more than 2,000 students at Monash University by the Department of Social and Preventive Medicine showed that 38 per cent of first year and 49 per cent of second year students suffered mental illness of varying degrees.

I believe that there should be a radical reorganization of tertiary education so that in an individual's life there would normally (not exceptionally) be an hiatus of at least eight to ten years between the completion of "secondary" (or first phase) education at an age of say 16 or 17 and the commencement of "tertiary" (or second phase) education. There should be accompanying economic and fiscal reforms so that appropriate people are easily able to start a university career at an age of 25 or more. The recent practice of universities allowing students who have been offered places to postpone their actual entrance by a year or two, is a move in the right direction, but in my view does not go nearly far enough.

It may be true that at the age of 30 or 40 one is well over the hill with respect to I.Q. but it is fairly clear that increased experience, motivation and especially emotional maturity more than compensate for this in the mastery of knowledge.

A Bibliography of V. Hilary Jolly's Scientific Works

1. (1952) A preliminary study of the limnology of Lake Hayes. *Aust. J. mar. Freshwat. Res.* 3, 74-91.

2. (1953) Observations on the genus *Bosmina* in New Zealand. *Hydrobiologia* 5, 309-313.

3. (1955a) *A Review of the Freshwater Cladocera of New Zealand.* M.Sc. thesis, University of Otago.

4. (1955b) A review of the *Calamoecia* and *Brunella* (freshwater Copepoda). *Hydrobiologia* 7, 279-284.

5. (1957a) Thermal stratification in some New Zealand lakes. *Proc. N.Z. ecol. Soc.* 4, 43-44.

6. (1957b) A review of the copepod genus *Boeckella* in New Zealand. *Trans. R. Soc. N.Z.* 84, 855-865.

7. (1958) A preliminary study of some New Zealand lakes. *Verh. int. Verein. theor. angew. Limnol.* 13, 436-438.

8. (1959) *A Limnological Study of some New Zealand lakes.* Ph.D. thesis, University of Otago.

9. (1963) The North Island lake smelt. *New Zealand Outdoor* 28(7), 15-16.

10. (1965) Diurnal surface concentrations of zooplankton in Lake Taupo, New Zealand. *Hydrobiologia* 25, 466-472.

11. (1966) The limnetic Crustacea of six reservoirs in the Sydney area of New South Wales. *Verh. int. Verein. theor. angew. Limnol.* 16, 272-723.

12. Jolly, V.H. and Chapman, M.A. (1966). A preliminary biological study of the effects of pollution on Farmer's Creek and Cox's River, New South Wales. *Hydrobiologia* 27, 160-192.

13. (1967) Observations on the smelt *Retropinna lacustris* Stokell. *N.Z. Jl. Sci.* 10, 330-355.

14. (1968) The comparative limnology of some New Zealand lakes. I. Physical and chemical. *N.Z. Jl. mar. Freshwat. Res.* 2, 214-259.

15. Irwin, J. and Jolly, V.H. (1970). Seasonal and areal temperature variation in Lake Wakatipu (Note). *N.Z. Jl. mar. Freshwat. Res.* 4, 210-216.

16. Jolly, V.H. and Brown, J.M.A. (Eds.) (1975). *New Zealand Lakes.* (Auckland University Press: Auckland.) 388 pp.

A SURVEY OF THE FRESHWATER FISHES OF NEW SOUTH WALES*

By D.A. Pollard

(New South Wales State Fisheries, Sydney)

I suppose my interest in the conservation problems of the Australian freshwater fish fauna was really first stimulated early in 1964 when my Ph.D. supervisor at Monash University, Jock Marshall, asked me to write a chapter on the subject, together with Trevor Scott of the South Australian Museum, for his book "The Great Extermination". It was only while trying to ferret out some information for this article that I began to realise how little was known about the distribution and abundance of our freshwater fishes. Indeed the only book on the subject was Gilbert Whitley's 1960 Jacaranda Pocket Guide to the Native Freshwater Fishes of Australia, and the only general article I could find on the problems of their conservation was a short paper, also by Whitley, in the *Australian Museum Magazine* of 1955 entitled "Conservation of Freshwater Fishes and Shoreline Fauna".

In 1969 I found myself in London writing up some previous work in Humphry Greenwood's freshwater fish section at the British Museum. During this time Greenwood went off to Africa to do some deepwater trawling in Lake Victoria, where he had been working on and off for nearly twenty years, and came back to mention casually that he had trawled up (if I remember rightly) some twenty tons of new species of cichlids from its depths.

The success of Greenwood's latest fishing trip, and three articles that I read during this time in London, set me to thinking about what sort of research programme I would like to get involved in when I returned to Australia, and specifically to thinking about a freshwater fish survey.

The three articles which set me thinking along these lines were a 1969 paper in the *Journal of Fish Biology* by Peter Maitland entitled "A preliminary account of the mapping of the distribution of freshwater fish in the British Isles", in which the then recently commenced British survey and the computerised data storage and retrieval system being used for it were described; the section by Robert Miller on endangered freshwater fish species of the world in the International Union for Conservation of Nature's 1969 "Red Data Book", which of course made no mention of any Australian fishes; and "A proposal to establish a biological survey of Australia" by the Fauna and Flora Committee of the Australian Academy of Science, which was published in the then *Australian Journal of Science*, also in 1969.

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* Paper delivered at the Fifteenth Annual Congress of the Australian Society for Limnology held at Tanunda, South Australia, in May 1976. Progress of this Survey up to June 1975 was reported at the Second Annual Conference of the Australian Society for Fish Biology held at the Brackish Water Fish Culture Research Station, Port Stephens, in August 1975.

Being a member of the "post-doctoral unemployed" at the time, and having nothing better to do than romance about such ideas, I jotted down some notes on how I would go about it if somebody just happened to offer me the job of setting up a survey of the freshwater fishes of Australia.

The ideas that I had at that time, unpractical as they now seem in retrospect, especially considering the vast areas involved, were roughly as follows:

To first collate all available locality records for fishes collected from fresh and other inland waters in Australia and Papua-New Guinea from the catalogues of the various Australian museums, the collections held by fisheries departments, universities and other scientific organisations, and from all available published sources on the faunas of these areas, to feed all of this information into a computer data bank, and from the accumulated data to then prepare detailed distribution maps for each of the nominal species involved - which was basically the same procedure as that used by Maitland in his mapping of the British freshwater fish fauna.

From this existing information I thought that it may be possible to delineate changes in the distributions of some of the species over the past 100 years or so, and to maybe correlate some of these changes with the introduction or spread of exotic fish species and/or the occurrence of man-induced environmental changes to the waterways (such as dam and weir construction, de-snagging of river channels, water pollution, etc.). Some information on the relative commonness or rarity of the different species would also be provided, and of course those areas which had either not been collected, or in which collecting had been most inadequate, would become apparent. With the above as background information, I thought that I should be able to outline how a detailed field survey could most profitably be carried out, and suggest possible conservation strategies for some of the species which may be rare or in some way endangered - maybe providing the information necessary for the inclusion of some of them in the "Red Data Book's" list of endangered species.

This saga of occasionally romancing about these ideas but having no opportunity to act upon them continued until mid-1972, when I had the opportunity to carry out a survey of the fishes of the Alligator Rivers uranium province area in the "Top End" of the Northern Territory for the Australian Atomic Energy Commission. Here, in a seasonally flowing tributary of the East Alligator River, we collected 28 species of native freshwater fishes within a 20 kilometre radius of our base camp (which figure compares interestingly with the total of only 27 native species known to occur in the entire Murray-Darling River system). This little excursion back into the freshwater realm, and of course the appearance of John Lake's book on the "Freshwater Fishes and Rivers of Australia" in 1971, which emphasised how little was really known, again whetted my appetite to get involved in a more comprehensive survey of our freshwater fish fauna.

Such an opportunity arose in 1974 when New South Wales State Fisheries and the Australian Museum applied for and were awarded a joint grant from the Australian Biological Resources Study Council to carry out a survey of the freshwater fishes of New South Wales. Doug Hoese and John Paxton from the Museum, and Leighton Llewellyn, Norm Mackay and myself from Fisheries, are all involved in this project, each of us only on a very much part-time basis. The grant money we received has been used to pay the salaries and field expenses of our two field staff, Peter Parker and Ian Briggs, who are doing most of the legwork for the survey, and also the salary and travelling

expenses of Bob McDowall from the New Zealand Fisheries Research Division, whom we brought over here for five months from last December to sort out the taxonomic problems of a number of the more systematically confused families and to help collate the data from the survey. McDowall also came over for a month towards the end of 1974 to help us set up the survey - so as you can see the whole project is very much a team effort.

With regard to the Biological Resources Study Grant scheme in general, the previous Australian Government made available three-quarters of a million dollars over the two year period ending June 1976, "to stimulate the study of the taxonomy, distribution and ecology of Australia's biological resources", paying special attention to "(a) areas in which rapid changes are taking place in the natural environment, (b) remote unstudied areas, (c) achieving a scientific inventory of animals and plants, and (d) in the ecological areas, to descriptive studies involving a substantial taxonomic, faunistic or floristic component". Particular emphasis was also placed on "data storage and retrival" and on the "preservation and maintenance of collections".

The objectives of our New South Wales survey are in fact much the same as those I outlined for my fanciful Australia-wide survey, though the approach is slightly different in that we moved directly into the field collecting operation at the beginning of the survey and are feeding whatever data is already available from previous collection records into our record system as we go along. The primary aims are thus to delineate the distribution, and where possible estimate the relative abundance, of each of the species inhabiting the freshwater and other inland waterbodies of New South Wales, using data from both our own and other workers' field surveys and also records from past collections; to provide material for studies of the systematic relationships of the more taxonomically difficult groups; to determine the main habitat requirements of the different species by correlating their distributions and abundances with the environmental data recorded at the collection sites; to hopefully elucidate some of the effects of introduced fish species (e.g. carp) and man-made environmental changes on the distributions and abundances of some of the species; and to provide information on those species which are found to be either rare or of very restricted distribution (e.g. grayling), which information can be used to formulate appropriate policies for their conservation and protection.

Turning to the practical aspects of the survey, we are attempting to obtain an overview of the distribution of the fauna by sampling a selection of representative waterbodies in each of the 42 drainage basins of the State, and between December 1974 and the present (May 1976) our field team has sampled 22 of these basins fairly comprehensively and 12 more superficially. Of the sixty or so freshwater fishes which might be expected to occur in New South Wales waters the survey has so far collected 47 identified and 5 ot 6 unidentified species. This sampling effort has so far involved over 170 days in the field, almost 22,000 miles travelled and over 200 collection stations sampled.

With regard to the actual field operation, the specimens are mainly caught using gill nets, seines, dip nets and rotenone, and where possible they are photographed either live in a field aquarium or only recently dead. Environmental and other data collected at each sampling site is recorded directly onto computer data sheets in the field.

Samples of each species are preserved in the field for incorporation into the collections of the Australian Museum, and the locality data for each species is plotted (by 10 minute grid squares) on a transparent overlay to a map of the waterways of New South Wales. The information for each species/collection site from the field data sheets is then punched onto separate computer cards and added to the computer data bank for analysis on completion of the survey.

Finally, with regard to publication of the results of the survey, three main forms of publication are envisaged.

The first is a field guide to the freshwater fishes of south-eastern Australia, which will contain a description and biological notes together with an illustration and distribution map for each species. This field guide is presently being prepared and edited by Bob McDowall from contributions from both the other participants in the survey and a number of outside specialist workers, and probably will be published by the Australian Museum.

From the basic information included in this field guide, and following the computer analysis and collation of the environmental data for each species from the collection records, it is then planned to prepare a more detailed and comprehensive book on the south-eastern Australian freshwater fish fauna. In addition to individual family and species accounts and keys, general chapters will also be included on such topics as zoogeography and origin of the fauna, breeding biology, distribution in relation to habitat requirements, conservation problems, and utilisation by man (including amateur and commercial fishing, fisheries management, hatchery production and stocking, and potential aquarium species). Colour photographs and detailed distribution maps would also be included for each of the species covered.

The third mode of publication for the results of the survey will mainly comprise systematic revisions of particular families, genera or other taxonomic groups (e.g. McDowall on galaxiids and retropinnids and Hoese on eleotrids), but computer analysis of the field collection data should also provide sufficient information on environmental requirements, etc., in relation to distribution and abundance of the fauna, and on actual and potential environmental and conservation problems, for one or more publications on these aspects.

Having earlier mentioned "completion" of the survey, we all hope that there will in fact be no definite end to it, but that information from future fish collections will be fed into the data bank we have established. In fact, we hope to have our grant renewed this year so that we can complete our coverage of the drainage basins of the State and look in detail at areas and species which we determine, from our initial "overview" survey, to be of critical interest (especially from the points of view of environmental problems and conservation). We also hope to look at some waterbodies in adjacent States which might affect the distributions of fishes in New South Wales, and of course we would like to see the survey eventually spread to become Australia-wide. In the meantime we are looking for cooperation from other freshwater fish workers who may be collecting in New South Wales, and will be happy to provide field data sheets, and of course a feedback of information from the survey, to anybody who would like to participate.

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HEADINGS FROM COMPUTER DATA SHEET SHOWING RANGE OF ENVIRONMENTAL DATA RECORDED AT EACH FIELD COLLECTION STATION

17

	1 2 3 4	5 6	7 8	9 10	11 12 13	14 15 16	17 18	19	20 21 22	23 24 25 26	27 28 29 30	31 32 33 34	35 36 37 38 39	40 41 42 43	44 45 46 47 48	49 50	51	52	53	54	55	56 57 58	59 60 61	62	63 64	65	66	67	68 6
	YEAR	MONTH	DAY	TIME or SERIAL NO.	COLLECTORS INITIALS	FAMILY NO.	SPECIES NO.	SUBSPECIES NO.	NO. IN SAMPLE	FROM	TO	LATITUDE	LONGITUDE	RIVER DRAINAGE	TRIBUTARY NAME	ALTITUDE (×100m)	HABITAT CATEGORY	HABITAT SUBTYPE	NATURE OF WATER BODY	WATER ORIGIN	FLOW	HABITAT WIDTH (m)	HABITAT LENGTH (m)	HABITAT OBSTRUCTIONS	BOTTOM TYPE	VEGETATION TYPE	VEGETATION COVER	DEPTH OF CAPTURE (m)	
1																													
2																													
3																													
4																													

AUSTRALIAN MUSEUM and NEW SOUTH WALES STATE FISHERIES – FRESHWATER FISH SURVEY OF NEW SOUTH WALES

Dates: From To

	73 74	75 76	77	78	79	80	SCIENTIFIC NAME	COMMON NAME	ADDITIONAL LOCALITY	ADDITIONAL DATA	SERIAL NO.
	WATER TEMPERATURE (C°)	COLLECTING METHOD	MUSEUM SPECIMEN RECORD SOURCE	IDENTIFIER NO.							
1											
2											
3											
4											

Water clarity (70)
Salinity (71-72)

WILL BALKHASH FOLLOW THE FATE OF THE CASPIAN SEA?*

by Tomi Petr

(Department of Zoology, Monash University)

In 1970 a new dam closed the River Ili, and the Kapchagay reservoir started to fill. The filling of this reservoir extended over a period of five years.

The Ili originates in China, and enters the USSR north-east of Alma-Ata, the capital of Turkmen Soviet Republic in Soviet Central Asia. On its way through the USSR, the river flows from east to west through semidesert and desert country, accepting tributaries predominantly along its left (southern) bank. These are draining the high mountains of Zailiyskiy Ala-Tau. The river is navigable between China and Lake Balkhash.

The mean annual volume of water entering Balkhash through the River Ili before the closure of the dam was 13.4 km^3, and the evaporation and evapotranspiration loss in the Ili delta was 3 km^3 (Sechnoy 1975). The formation of the Kapchagay man-made lake on the Ili appears to have similar effects on Lake Balkhash, as the building of a cascade of dams on the Volga River have had on the Caspian Sea: both have resulted in lowering the water level in the recipient inland lake, and in the disappearance of extensive shallows which served formerly as spawning and feeding grounds for fish and as important fishing grounds. In Lake Balkhash these areas are also famous for otter hunting.

During the period 1958-1968 the mean water salinity in the western sector of Lake Balkhash (the sector which is directly influenced by the Ili River) was 1.05 g/l, that of the eastern sector 3.36 g/l. As a result of filling the Kapchagay reservoir, the salt content in Balkhash has risen by 0.7 g/l:

	1970	1971	1972	1973	1974	Total difference
	Western Balkhash					
Volume of water entering the coastal lakes (km)	1.65	1.21	0.91	0.79	0.73	-0.92
Salt volume in water at the end of the year (million tons)	62.64	64.15	66.29	67.65	68.89	+7.88
Water mineral content at the end of the year (g/l)	1.19	1.32	1.44	1.57	1.74	+0.69

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* Paper delivered at XV Congress of the Australian Society for Limnology, Tanunda, S.A.

	1970	1971	1972	1973	1974	Total difference
	Eastern Balkhash					
Volume of water entering the coastal lakes (km^3)	1.12	1.01	0.80	0.60	0.46	-0.66
Salt volume in water at the end of the year (million tons)	212.7	209.6	207.2	206.3	206.0	-6.7
Water mineral content at the end of the year (g/l)	3.51	3.66	3.79	3.93	4.07	+0.56

Apart from the effect on fish, the increased salinity will interfere with the supply of water for industrial purposes and for vegetable gardens along the western coast.

As a result of filling the Kapchagay reservoir, the water level in Lake Balkhash dropped by 1.6 m, its volume was reduced by 31.5 km^3, and the area of the lake contracted by 1700 km^3. The most drastic changes occurred in the coastal shallows of the western Balkhash, which are the principal spawning and feeding grounds for fish. Thus, the changes are not dissimilar from those in the Caspian Sea where the catch of valuable anadromous and semi-anadromous species declined from an annual average of 374,000 metric tons, for 1936-1940, prior to major interference with the hydrologic regime, to 82,000 tons for 1965-1968, after the Volga and Kama Rivers' characteristics had been significantly altered (Micklin 1974).

It is surprising that the Soviet Union, where scientists are foremost in research upon the man-made lake environment, does not take preventive measures to avoid repetition of the situation which occurred in the Caspian Sea. Doubtlessly, in both cases numerous Soviet scientists were aware of the environmental consequences well in advance of these projects. It appears that the industrial development in the Soviet Union still has an absolute priority over other aspects, including environmental. This was shown also by the contradictory Aswan Dam project in Egypt build by the USSR. The role of the Soviet limnologists and environmentalists appears to be largely limited to recording changes in the environment, with little, if any advisory power.

References

Micklin, P.P. (1974). Environmental costs of the Volga-Kama cascade of power stations. *Water Resources Bull. AWRA* 10: 565-572.

Sechnoy, G.M. (1975). The effect of filling of Kapchagay man-made lake on the aquatic and salt balance of Lake Balkhash. (In Russian) In: Cycling of Matter and Energy in Lakes: 161-164. Izd. Nauka, Sibir. Branch, Novosibirsk.

ECOLOGY OF *PARATYA AUSTRALIENSIS**

by W.D. Williams

(Department of Zoology, University of Adelaide)

In this paper I want to talk about yet another invertebrate, a small unimportant prawn of no academic significance. The paper is purely descriptive and the prawn is confined to Australia. This account will be of interest only to a few biologists here. The work has involved several people working at my behest; I will do my best to avoid acknowledging their help. The basic work was done in 1961 to 1964, but due to much more important matters, and research easier to publish, has not comprehensively been dealt with until now. Besides which, being at the present time Chairman of a university department, the only papers I can publish must now be plagiarisms (otherwise known as reviews) of other people's work, books (which are not subject to refereeing) and/or based on research before being condemned to a chair. The lack of preparation is due to my lack of time, consequent upon the time needed to spend my now greatly increased salary, time needed for consulting (much more profitable) and my knowledge that this particular paper is only an oral presentation to a group of people who don't know a freshwater prawn from a bunch of bananas. I am surprised however, that the audience is so big and I wish now I had spent more time on the paper's preparation. I have only one slide because they take a long time to prepare. However, I propose to show three copies of this to compensate. Those of you who wish to leave after such a stimulating introduction please feel free to do so.

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* Part of paper delivered at the XV Congress of the Australian Society for Limnology, Tanunda, S.A.

In view of the author's comments, it was decided that the only material of interest worth reproducing in the Society's Newsletter was the introduction.

Ed.

OCCUPATIONAL HAZARD OF INDIAN FISHERMEN

by Tomi Petr

(Department of Zoology, Monash University)

Statistics on casualties in various occupations indicate that in Indian sundarban forests (estuarine forests) during the 12 years period 1963-1974 tigers have attacked 132 fishermen, 108 honey collectors, 36 timber-traders, and 72 others (Chaudhuri and Chakrabart, 1974). The tigers usually hunt for human prey between 7 a.m. and 9 a.m., and 3 p.m. and 5 p.m. at which times 90 percent of the casualties occur. Those tigers operating at night and picking up men from boats are considered to be most dangerous and most cunning. Acrobatic feats which enable the animal to get into a boat have been explained adequately in a separate article (in press, *Journal of Bot. Soc.*, Bengal*). It appears that the number of casualties has considerably declined in the last two years.

The moral of the story: (a) take care while surveying the sundarbans; (b) environmentalists, raise you voice against the decline in human casualties - the tigers may need protection.

References

Chaudhuri, A.B. and Chakrabarti, K. (1974). Wild life biology of sundarbans forests. *Science and Culture* 40: 93-99.

Chaudhuri, A.B. and Chakrabarti, K. (1974). Wild life biology of sundarbans forests. *Science and Culture* 40: 207-213.

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*Have not seen in original.

BOOK REVIEW

"REPTILES AND AMPHIBIANS OF AUSTRALIA"

BY H.G. COGGER

Published by A.H. and A.W. Reed, Sydney, Wellington and London ($23.95)

REVIEWED BY W.D. WILLIAMS, UNIVERSITY OF ADELAIDE

As the complete naturalist guide to a group of animals (in this case, two), this book represents the ultimate approach. It is comprehensive, it has keys to all families, genera and species, each species is succinctly described together with a map showing its geographical distribution, and most species are illustrated with either black and white photographs or coloured prints. Further, production is of a very high standard with good quality paper, a clear type and a pleasing layout. All in all, first impressions are extremely favourable: it is indeed a handsome book.

However, careful examination of the text and in particular an examination of the author's taxonomic approach indicates that much is to be desired in terms of the systematic treatment of the taxa discussed. Thus, there are numerous cases where taxonomic changes from the previously published situation have been effected. This was most definitely not the place to have instituted such changes. A much more formal account which preceded the publication of the book was needed, and the taxonomic changes in the book should have been based upon this formal account.

One can raise other criticisms too against the author's treatment of specific groups. For example, in discussing the familial classification of the Anura (Frogs), the author writes "I regard this familial classification [that proposed by Dr. Savage] as more logical than any previously put forward and I have adopted it here with little modification." He then goes on to give the familial classification favoured. Then, almost unbelievably, he continues to use the old classification: instead of referring to the Myobatrachidae which he favours, he actually uses the family name Leptodactylidae, for example! The absence of synonyms also causes difficulty. Thus on page 113 he refers to *Rana daemeli* (incidentally, misspelt in the figure caption, p. 129, and p. 113), and it is only by referring to the remarks under the family Ranidae does it become clear that *R. daemeli* and *R. papua* may be synonymous. This particular example may cause confusion for in the recent book on Australian and New Guinea Frogs (M.J. Tyler, 1976, *"Frogs"*, Collins), the species is referred to as *R. papua* with no reference to its other possible name.

There is no doubt that the maps of geographical distributions add much to the value of the book. It is something of a carping criticism to add that at least in some of them there appears to be an element of what may be termed artistic licence. Some distributions are not nearly as precisely known as Cogger's maps would have us believe.

Despite the above criticisms, I am very glad indeed to be able to put my review copy in my bookshelf and there will be no doubt that I shall refer to it frequently and for many years. There is also no doubt that the book represents a required purchase for all Australian libraries and naturalists. Providing the latter, in particular, are on guard against the taxonomic changes instituted by Cogger *de novo* so to speak, they will find the book an immense and handy source of reference.

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UNQUOTABLE QUOTES

Sir Macfarlane Burnett on the proposed Redcliff uranium enrichment plant (August 14, 1976):

> "I don't think the ecology is particularly important. Any good engineer or nuclear scientist would be able to handle the ecological situation."

From a recent draft report on part of our environment:

> The floodplain immediately below the lake is considered generally to have a fairly high conservation potential ..... (and) ..... to be a particularly ecosensitive area because of its forest of red bums.

LETTERS TO THE EDITOR

From Drs. J.L. Hickman and A.M.M. Richardson, Department of Zoology, University of Tasmania, Hobart, Tasmania.

Overseas trained biologists are commonly dismayed by the tremendous barrier to ecological studies in Australia presented by the lack of handbooks on the local fauna, especially invertebrates. In discussing ways in which this situation might be improved it has occurred to us that the whole field of animal systematics is uncoordinated and lacks any form of association, group or forum wherein it can be discussed. We would welcome the opportunity to air our concern in your publication.

We feel that there is a need for some sort of organisation or body which would promote systematics in Australia. Such a body could, for example,

1. take steps to encourage the teaching of taxonomy in universities;
2. organise 'workshops' at which leading taxonomists, local and overseas, could share their expertise by working with and tutoring Australian students;
3. organise symposia;
4. organise and arrange for the preparation and the financing of the publication of keys, handbooks and monographs;
5. seek ways of providing a greater awareness in government, private enterprise and the general community, of the urgent need for sound systematic knowledge of the Australian fauna.
6. encourage the establishment of employment opportunities for taxonomists in government, semigovernment and private bodies.

We would appreciate receiving the names and addresses of those readers who share our concern although not necessarily our opinions. Given sufficient interest it is hoped that a discussion of the subject may be arranged in conjunction with A.N.Z.A.A.S. meeting in Melbourne in 1977.

FOR THOSE WITH BOATS

Ian Campbell has drawn attention to part of a publication that immediately raised sighs of "How True". It will have special meaning for most members of the Society.

"We come now to a piece of equipment which still brings anger to our hearts and, we hope, some venom to our pen. Perhaps in self-defense against suit, we should say, 'The outboard motor mentioned in his book is purely fictitious and any resemblance to outboard motors living or dead is coincidental'. We shall call this contraption, for the sake of secrecy, a Hansen Sea-Cow - a dazzling little piece of machinery, all aluminum paint and touched here and there with spots of red. The Sea-Cow was built to sell, to dazzle the eyes, to splutter its way into the unwary heart. We took it along for the skiff. It was intended that it should push us ashore and back, should drive our boat into estuaries and along the borders of little coves. But we had not reckoned with one thing. Recently, industrial civilization has reached its peak of reality and has lunged forward into something that approaches mysticism. In the Sea-Cow factory where steel fingers tighten screws, bend and mold, measure and divide, some curious mathematick has occurred. And that secret so long sought has accidentally been found. Life has been created. The machine is at last stirred. A soul and a malignant mind have been born. Our Hansen Sea-Cow was not only a living thing but a mean, irritable, contemptible, vengeful, mischievous, hateful living thing. In the six weeks of our association we observed it, at first mechanically and then, as its living reactions became more and more apparent, psychologically. And we determined one thing to our satisfaction. When and if these ghoulish little motors learn to reproduce themselves the human species is doomed. For their hatred of us is so great that they will wait and plan and organize and one night, in a roar of little exhausts, they will wipe us out. We do not think that Mr. Hansen, inventor of the Sea-Cow, father of the outboard motor, knew what he was doing. We think the monster he created was as accidental and arbitrary as the beginning of any other life. Only one thing differentiates the Sea-Cow from the life that we know. Whereas the forms that are familiar to us are the results of billions of years of mutation and complication, life and intelligence emerged simultaneously in the Sea-Cow. It is more than a species. It is a whole new re-definition of life. We observed the following traits in it and we were able to check them again and again:

1. Incredibly lazy, the Sea-Cow loved to ride on the back of a boat, trailing its propeller daintily in the water while we rowed.

2. It required the same amount of gasoline whether it ran or not, apparently being able to absorb this fluid through its body walls without recourse to explosion. It had always to be filled at the beginning of every trip.

3. It had apparently some clairvoyant powers, and was able to read our minds, particularly when they were inflamed with emotion. Thus, on every occasion when we were driven to the point of destroying it, it started and ran with a great noise and excitement. This served the double purpose of saving its life and of resurrecting in our minds a false confidence in it.

4. It had many cleavage points, and when attacked with a screwdriver, fell apart in simulated death, a trait it had in common with opossums, armadillos, and several members of the sloth family, which also fall apart in simulated death when attacked with a screwdriver.

5. It hated Tex, sensing perhaps that his knowledge of mechanics was capable of diagnosing its shortcomings.

6. It completely refused to run: (a) when the waves were high, (b) when the wind blew, (c) at night, early morning, and evening, (d) in rain, dew, or fog, (e) when the distance to be covered was more than two hundred yards. But on warm, sunny days when the weather was calm and the white beach close by - in a word, on days when it would have been a pleasure to row - the Sea-Cow started at a touch and would not stop.

7. It loved no one, trusted no one. It had no friends.

Perhaps towards the end our observations were a little warped by emotion. Time and again as it sat on the stern with its pretty little propeller lying idly in the water, it was very close to death. And in the end, even we were infected with its malignancy and its dishonesty. We should have destroyed it, but we did not. Arriving home, we gave it a new coat of aluminum paint, spotted it at points with new red enamel, and sold it. And we might have rid the world of this mechanical cancer!"

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CONFERENCES

N.Z.L.S. CONFERENCE

Christchurch 20-23 August

Three Australians made the trip to New Zealand for the N.Z.L.S. Conference; they were Peter Tyler, Rod Buckney and Richard Marchant.

Conference papers included contributions on macrophytes, epiphytes, plankton, molluscs, crustacea, fish and eutrophication. Guest speaker was Tom Northcote (University of British Columbia) who detailed some of the characteristics and problems of the Fraser River.

A symposium on South Island lakes prompted two of the Australians present to remark on how similar they were to Australia's South Island lakes.

Dr. Mike Taylor of the Ministry of Works introduced a lively discussion session on water quality criteria to be applied in New Zealand.

A field trip to the Waimakariri River was marred by a collision between the conference bus and a camper van. No one was hurt.

Some N.Z.L.S. members expressed the hope that they could attend an A.S.L. Congress fairly soon.

At the A.G.M. Dr. Carolyn Burns (University of Otago) was elected President; Laurel Teirney (Fisheries) accepted the job of Secretary-Treasurer.

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MINUTES

FOURTH EXECUTIVE COMMITTEE MEETING

Weintal Motel May 7, 1976

1. Agenda. A draft agenda circulated prior to the meeting was adopted with the addition of Item 6(a) (below).

2. Apology. I. Campbell

Present: K. Walker, D. Buckmaster, J. Powling, R. Buckney, F. Reynolds, R. Croome, K. Shearer, G. Ganf, T. Petr, M. Geddes.

3. Minutes. The minutes of the previous metting were circulated before the meeting and were adopted without change.

4. Correspondence. Secretary-Treasurer tabled correspondence for the period since the last meeting. A letter of resignation from Paul Chaplin was read. The meeting recorded appreciation for his work in the Society, particularly in the initial years. Mr. Chaplin was a member of the Victorian Piscatorial Council which is now an Institutional Member of ASL.

Secretary-Treasurer had written to Institutional Members informing them of the cessation of publication of the Bulletin, and suggesting that in future they pay for publications as they receive them. The University of Liverpool Library had written a letter of resignation from the Society.

President had written to Dr. J. Kirk inviting a paper for the XV Congress.

The Australian Society of Plant Physiologists had sought views on a proposal to establish liaison between Societies with overlapping interests, with a view to encouraging joint or concurrent meetings at the same venue. After discussion, it was decided to write in support of the idea, and stating ASL's practice with regard to Congresses.

5. Business Arising from the Minutes. President reported that Ian Bayly had not replied to his suggestion that his paper on Hilary Jolly be submitted for publication in the Australian Journal of Marine and Freshwater Research, but would raise the matter again.

Secretary-Treasurer reported that J. Wharton had accepted the position of Chairman of the Hilary Jolly Award Selection Committee.

6. Other Business. (a) G. Ganf suggested that ASL write to the Editor-in-Chief of AJMFR seeking that:

(i) there be two referees appointed to examine papers
(ii) no fee be granted to referees
(iii) referees be given the option of identifying themselves to authors.

After discussion, this matter was referred to the AGM.

(b) The Committee then discussed arrangements and business for the Annual General Meeting. There was some discussion about the relevance of a Presidential Address at an AGM.

Meeting closed at 12.20 a.m.

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MINUTES

FIRST EXECUTIVE COMMITTEE MEETING

Weintal Motel May 9, 1976

1. Apologies. K. Walker, D. Cannon, T. Hillman.

Present: D. Pollard, R. Buckney, N. Ruello, F. Reynolds, H. Burton, K, Shearer, G. Ganf, R. Tilzey, L. MacMillan.

2. Appointment of Newsletter Editor. W. Williams was reappointed to this position. The following general policy concerning the Newsletter was adopted:
Its scientific content should be increased to compensate for the loss of the Bulletin,
If possible, stiffer covers should be provided,
Its distribution should be widened to include Education Departments.

3. Appointment of Editorial Committee. It was decided to allocate specific tasks to members of the Editorial Committee. The following were nominated:

K. Walker (Convenor) and W. Williams to investigate the publication of taxonomic handbooks
I. Hiscock and I.Bayly to investigate the publication of a Hilary Jolly memorial book
I. Hiscock to handle the current publication of J. Peterson's thesis.

4. Venue for next Congress. It was resolved that the venue be Lismore. Secretary-Treasurer to write to J. Lake informing him of this and that the President would contact him.

5. New Zealand Meeting. Secretary-Treasurer was asked to write to NZLS seeking more information.

6. Jolly Award. Meeting discussed the matter of nominations and felt that nominations should stand for three years.

7. Library. It was resolved that the library be moved to Narrandera where it could be properly stored. K. Shearer was appointed Librarian. A notice would be published in the Newsletter announcing the move and asking that members send their reprints to K. Shearer.

8. Directory. It was resolved that the new issue should contain a taxonomic listing. Future Directories should also list types of organisms which could be sent to the member for identification.

9. Contact with schools. It was agreed that R. Grandison be asked to provide ideas and information on which the Executive Committee could act.

Meeting closed at 6.00 p.m.

* * * * *

MINUTES

FIFTEENTH ANNUAL GENERAL MEETING

Tanunda, South Australia May 9, 1976

1. Agenda. A draft agenda distributed before the meeting was adopted.

2. Apologies. J. Bradbury, J. Lake, H. Midgley, R. Pearson, P. Suter, I. Smalls, J. Thomson, L. Wyse.

3. Minutes. Minutes of the XIV Meeting were circulated prior to the meeting and were duly confirmed. Business arising from these minutes was dealt with under General Business (item 14, below).

4. Correspondence. Secretary-Treasurer read out a letter from J. Lake pointing out the important role played by Hilary Jolly in the formation of the Society. Mr. Lake also offered Lismore as the venue of the XVI Congress.

5. President's Report. Dr. Walker summarised the developed of the Society during the past year. He thanked the members of the Executive Committee and of the Congress organising committee for their efforts.

President reflected on the merits of the Society, drawing attention to its breadth of membership, vigour, and the success of its Congresses which were sufficiently informal to allow close contact between new, young workers and established and eminent people. He stressed that there was room to increase the Society's breadth especially by catering more for engineers, and pointed out that activism in conservation issues - if it became an ASL activity - could undermine the Society's unity and broad base of membership.

Dr. Walker suggested that ASL could adopt the task of publishing taxonomic handbooks.

6. Secretary-Treasurer's Report. Dr. Buckney summarised membership and the financial state of the Society. He pointed out that considerable cost increases during the year had been partly absorbed by economy measures.

The following is a summary of membership and the financial position:

MEMBERSHIP	Ordinary members (full & student)	242
	Institutional members	57
	Sustaining members	2
	Total	301

FINANCIAL

(i) General Account

Balance 30/4/76	1637.85	Balance 30/4/76	750.97
Income	2344.79	Expenditure	3231.67
	3982.64		3982.64

(ii) Publication Account

Balance 30/4/76	142.65	Balance 30/4/76	437.60
Income	588.18	Expenditure	293.23
	730.83		730.83

(iii) Jolly Award Account

Balance 30/4/76 131.07

7. Honorary Auditor's Report. Prof. Williams reported that the financial statement accurately reflected the Society's finances.

8. Jolly Award and Hilary Jolly Memorial Lecture. Mr. Wharton reported that no nominations for the Jolly Award had been received this year. A further call for nominations would be inserted in the next Newsletter.

On the instigation of the President, the meeting resolved that a Hilary Jolly Memorial Lecture should be a feature of future Congresses; the recipient of the Award would be invited to deliver the lecture at the following Congress.

9. Editorial Committee Report. Dr. Hiscock said that progress was being made in the publication of J. Peterson's work on the morphology of Tasmanian lakes. The Geography Department of Monash University was bearing some of the cost of this project. Dr. Hiscock suggested that the Society give serious thought to the publication of a book of invited papers in memory of Hilary Jolly.

10. Newsletter Editor's Report. Prof. Williams summarised aspects of Newsletter production during the year. He asked that more material for inclusion be sent.

11. Constitutional Amendment. It was moved by M. Geddes (seconded G. Ganf) that Clause 5 of the Constitution be amended to give student members voting rights, so that it would read as follows:

5. Voting: Each Ordinary member, each Student member and each of the nominees of Sustaining members shall be entitled to one vote at a General Meeting or in a postal ballot and each Affiliated Body shall have the right to appoint a delegate who shall be entitled to one vote at a General Meeting or in a postal ballot. Honorary members shall not have a right to vote. All votes shall be cast personally and not by proxy.

CARRIED

12. Election of Office Bearers 1976/77. Dr. Walker declared all Society offices vacant and called for nominations for the Committee. The following were duly elected.

President	D. Pollard
Vice-President	D. Cannon
	K. Walker *(ex officio)*
Secretary-Treasurer	R. Buckney
Committee	H. Burton
	F. Reynolds
	G. Ganf
	R. Tilzey
	L. MacMillan
	N. Ruello
	K. Shearer
	T. Hillman

Dr. Pollard took the chair.

13. Appointment of Honorary Auditor. F. Reynolds was elected to this position.

14. General Business

(a) Arising from the minutes of the XIV Meeting:

(i) AJMFR: Secretary-Treasurer reported that 176 members were entitled to receive the journal and should receive the first issue soon.

(ii) LIBRARY: Mr. Tilzey reported on the state of the Library and said that it was not used. A list of current holdings would appear in the next Newsletter.

(iii) DIRECTORY: Dr. Bishop reported that a new issue was in preparation.

(iv) N.Z. MEETING: Secretary-Treasurer had nothing new to report on this, apart from the date (weekend of Aug. 21).

(v) PROJECT AQUA: Mr. Campbell gave details of the activities of the *ad hoc* committee, and would have a form for listing specific sites for conservation published in the Newsletter.

(b) Subscription

Meeting agreed that the following subscriptions be set for 1976/77:

Ordinary Members	$8.00
Student Members	$4.00
AJMFR extra	$4.00

Institutional members to pay for material as they receive it.

(c) Venue for XVI Congress

The meeting was offered Lismore by J. Lake and Port Stephens by D. Francois. A final decision was left to the Executive Committee.

(d) Promotion of ASL through Education Departments

Mr. Grandison proposed that ASL contact the State education authorities concerned with biology in order to make available sources of information about freshwater ecology and thus promote its identity with biology teachers throughout Australia. The meeting supported this suggestion and referred it to the Executive Committee for action.

(e) AJMFR Referees

Dr. Ganf suggested that ASL should seek to have as AJMFR policy
(i) two referees for each paper submitted
(ii) elimination of the fee paid to referees
(iii) referees to have the option of identifying themselves to authors.

This matter was discussed briefly and deferred till another time.

(f) Dr. Francois asked that in future more time be set aside for the AGM.

(g) The meeting joined Mr. Burton in supporting Dr. Walker's idea that the Society publish taxonomic handbooks.

(h) Mr. Reynolds expressed appreciation for Dr. Walker's work during the year.

Meeting closed at 1.45 p.m.

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A.S.L. LIBRARY

The Library has been moved to Narrandera where Karl Shearer is Librarian.

It is hoped that the Library will become an archive of Australian Limnology. Members are asked to place

Mr. K. Shearer,
ASL Librarian,
Inland Fisheries Research Station,
P.O. Box 182,
NARRANDERA, N.S.W. 2700.

on their reprint mailing lists.

THE AUSTRALIAN SOCIETY FOR LIMNOLOGY

CONSTITUTION

(as amended, Tanunda, S.A., May 1976)

1. NAME:

The name of the Society shall be the Australian Society for Limnology.

2. OBJECTIVES:

The objectives of the Society shall be to establish effective liaison between all persons interested in any aspect of fresh and brackish water research in Australia, and to promote their study, and to encourage these interests in State and Commonwealth Research Institutes and Departments, and educational institutions.

3. MEANS OF ATTAINING OBJECTIVES:

The following means may be used to attain the objectives of the Society:

(a) The establishment and maintenance of a register of all persons working in fields relevant to Limnology in Australia and adjoining countries, giving details of their current interests and relevant publications.

(b) The holding of an Annual Congress which will coincide with the Annual General Meeting.

(c) The production of a Newsletter (which shall be distributed to all financial Members and all Honorary and Sustaining Members) by an editor to be appointed by the Executive Committee.

(d) The publication of any scientific or other information relevant to the objectives of the Society. Scientific material shall, before publication by the Society, be considered and approved by an editorial board of at least two members appointed annually by the Executive Committee.

(e) The encouragement of interest in limnology and support for the Society by the granting of awards and by recognition of supporters through special categories of membership.

4. MEMBERSHIP:

(a) The members of the Society shall be:

(i) Ordinary members who shall be persons admitted to membership by the Executive Committee, who shall pay such annual subscriptions as shall be fixed from time to time.

(ii) Student members who shall be University undergraduates or scholars at any educational Institution, who shall pay such annual subscriptions as shall be fixed from time to time.

(iii) Honorary members who may be elected for a limited specific period by the Executive Committee.

(iv) Honorary Life members who may be appointed at an Annual General Meeting on the recommendation of the Executive Committee.

(v) Sustaining members, who may be individuals, companies or organisations, admitted as such, by the Executive Committee, in accordance with the following requirements, and have the privileges indicated below -

(i) Any individual, company or organisation contributing the sum of $50.00 or more in any one year shall be eligible for admission as a Sustaining Member.

(ii) Sustaining Members who are companies or organisations shall have the right to nominate two persons who shall enjoy all the privileges of ordinary members, including the right to vote, but not to hold office, while Sustaining membership is current.

(iii) Sustaining members shall be acknowledged in all official publications of the Society for a period of 12 months from the date of their contribution, and in any other manner as the Executive Committee may from time to time decide.

(vi) The Executive Committee may, in its absolute discretion, refuse admittance to any classification of membership, and shall be under no obligation to give any reason to any person, for its decision not to elect any candidate.

(b) Affiliated Bodies, Incorporated or unincorporated bodies and other organisations approved by the Committee may become affiliated with the Society on acceptance by the Executive Committee and on payment of such annual subscription as may be fixed from time to time.

(c) A register of members and affiliated bodies shall be kept by the Secretary-Treasurer.

5. VOTING:

Each Ordinary member , each Student member and each of the nominees of Sustaining members shall be entitled to one vote at a General Meeting or in a postal ballot and each Affiliated Body shall have the right to appoint a delegate who shall be entitled to one vote at a General Meeting or in a postal ballot. Honorary members shall not have the right to vote. All votes shall be cast personally and not by proxy.

6. ANNUAL SUBSCRIPTION:

The Annual Subscription shall be due on the 1st July in each year and the amount shall be fixed at the preceding Annual General Meeting. Members whose subscriptions are not paid by the succeeding 31st December shall be unfinancial and shall forfeit all rights and privileges of Membership forthwith.

7. RIGHTS OF MEMBERS:

All financial members are entitled to recieve current issues of the Society's Newsletter, scientific and other publications free of charge, and to attend all general meetings of the Society.

8. MANAGEMENT:

The Society shall be managed by an Executive Committee consisting of the President, the immediate Past President *(ex officio)*, the Vice-President and the Secretary-Treasurer, together with not less than 5

and no more than 8 other members, all of whom shall be elected at the Annual General Meeting. This Executive Committee shall implement the Society's general business, and a simple majority shall decide all questions at Executive Committee Meetings. If voting is equal, a motion is lost. A quorum at Executive Committee Meetings shall be 4.

9. FINANCE:

The financial year of the Society shall cover the period from the 1st May in any year to 30th April in the next ensuing year.

(a) All funds received by the Society shall be banked in the name of the Society. Separate accounts may be established for specific purposes at the discretion of the Executive Committee. A Publication Fund shall be maintained, to which shall be credited all contributions received from Sustaining Members, together with any gifts specifically given for purposes of publications, and any monies from the general account of the Society transferred to such fund by resolution of the Executive Committee.

(b) All bills or accounts shall be certified as to their correctness by the Secretary-Treasurer, and shall be paid by cheque. All cheques shall be signed by any two of the President, Vice-President and Secretary-Treasurer.

(c) No bill or account shall be paid without the prior approval of the Executive Committee, which approval must be obtained at a meeting of the Committee or by mail. Expenditure of a general nature may be approved in advance during any one financial year. Any commitment to expenditure entered into by the Executive Committee which has not been paid by the date of the Annual General Meeting shall be drawn to the attention of the Annual General Meeting in the Financial Statement together with any amounts owing to the Society.

10. GENERAL MEETINGS OF THE SOCIETY:

The A.G.M. shall determine the date and place for the next Annual General Meeting. A special General Meeting may be called at the discretion of the Executive Committee and shall be summoned as soon as practicable following receipt of a request to do so signed by not less than twenty (20) members entitled to vote. Special General Meetings shall be called by notice in writing, specifying the business to be considered, and notices must be posted to all financial members not less than fourteen (14) days prior to the proposed date. No business shall be conducted at any Special General Meeting other than that specified in the notice convening the meeting.

11. QUORUM FOR GENERAL MEETINGS:

At all General Meetings, twenty (20) members entitled to vote shall constitute a quorum, and a simple majority shall carry a motion.

12. ANNUAL REPORTS:

An Annual Report and Financial Statement shall be submitted to the Annual General Meeting, and the Financial Statement shall be audited by a person appointed at the previous Annual General Meeting. In the event that the Annual General Meeting is held prior to the end of the financial year, a separate Financial Statement covering the period of the financial year shall be prepared by the Secretary-Treasurer and the auditor shall certify as to its correctness. Such audited report shall then be published in the Newsletter, or otherwise distributed to members as soon as practicable after the close of the financial year.

13. AMENDMENTS TO THE CONSTITUTION:

Amendments may be made to the Constitution of the Society at an Annual General Meeting or at a Special General Meeting, or by a postal vote. Any proposed amendments shall be submitted in writing over the signature of any two members to the Executive Committee which shall either -

(a) refer them for consideration at the next ensuing Annual General Meeting, or
(b) call a Special General Meeting, for the purpose of considering the proposed amendments, or
(c) conduct a postal ballot of all financial members.

A proposed amendement shall be carried by a two-thirds majority of votes polled. At least two weeks' notice shall be given to all members by the Executive Committee of any proposed change to the Constitution.

14. WINDING-UP OF SOCIETY:

The Society shall not be wound up except on a two-thirds vote in favour of doing so at an Annual General Meeting or a Special General Meeting called for this purpose and in either case at least two weeks' notice of the proposal shall have been given to all financial members, but shall be dissolved in the event of membership being less than 5 persons. The last General Meeting shall decide how the assets of the Society shall be disposed of, but this must be done in accordance with the aims of the Society and members shall not receive any benefit.

* * * * *

MEMBERSHIP STATISTICS
1975/76

New Members	30	
Resignations	2	(1 Ordinary Member, 1 Institutional)

Ordinary Members:

Full	180
Student	26
	206
Unfinancial	36
	242

Institutional Members:

Financial	35
Unfinancial	22
	57

Sustaining Members:
Gutteridge, Haskins & Davey
Zoology Department, University of Adelaide

FINANCIAL STATEMENT .... 1/5/75 to 30/4/76

A. GENERAL ACCOUNT

INCOME		EXPENDITURE	
Annual Subscriptions	2125.63	Bulletin:	
Cash sales of Key	11.25	Printing	1128.75
Refund from Canberra Congress	169.87	Reprints	484.00
Interest	38.04	Newsletter:	
		Copyright fee	4.58
		Hire of typewriter	25.20
		Copying	429.68
		Covers	94.59
		Transfer to Publication A/c	7.20
		Addressograph plates	27.74
		Envelopes	61.57
		Postage	238.93
		CSIRO (for AJMFR)	704.00
		Adjustment by bank	1.93
		Cheque books	8.00
	2344.79		3231.67
Balance at 30/4/75	1637.85	Balance at 30/4/76	750.97
	3982.64		3982.64

B. PUBLICATION ACCOUNT

INCOME		EXPENDITURE	
Transfer from General A/c	7.20	Delivery of Bulletins	7.20
Sale of publications ($100 from Monash Library)	159.00	Newsletter:	
		Printing	229.60
Sale of Reprints	27.00	Covers	56.35
Subscriptions, Institutional Members	387.47	Stamp Duty	.08
Interest	7.51		
	588.18		293.23
Balance at 30/4/75	142.65	Balance at 30/4/76	437.60
	730.83		730.83

C. JOLLY AWARD ACCOUNT

Balance at 30/4/75	150.00
Interest	4.70
	154.70
Purchase of book	23.63
Current Balance	131.07

R.T. Buckney,
Hon. Sec/Treasurer.

Audited and found correct.
(signed) W.D. Williams.

ABSTRACTS OF PAPERS GIVEN AT THE XV CONGRESS

1. HILARY JOLLY: AN APPRAISAL OF THE WOMAN AND HER CONTRIBUTION TO AUSTRALIAN LIMNOLOGY

A summary is presented of Hilary Jolly's contribution to the formation and sustenance of the Australian Society for Limnology, and of her contribution to Limnology in Australia and New Zealand.

I. BAYLY,
Zoology Department,
Monash University,
CLAYTON, Victoria. 3168.

2. REDISCOVERY OF THE AQUATIC SNAIL *Glacidorbis hedleyi* Iredale 1943

The rediscovery of the aquatic snail, *Glacidorbis hedleyi* Iredale, 1943, is reported. Previously known only from Blue Lake, Mt. Kosciusko, the species is recorded for the first time in Victoria. The genus *Glacidorbis* was placed by Iredale in the Basommatophoran family Planorbidae. Evidence is given for its replacement with the prozobanchs allied to the Hydrobiidae. Mention is made of closely related species occurring in Tasmania and Chile, South America.

B.J. SMITH,
National Museum of Victoria,
Russell Street,
MELBOURNE, Victoria. 3000.

3. ECOLOGY OF *Paratya australiensis* (Atyidae)

Paratya australiensis is a species of Atyid prawn widely distributed in the lakes and rivers of south eastern Australia. Its occurrence in rivers is of interest as it has a planktonic larval stage. This paper discusses the life cycle in relation to adaptations necessary for river life. The work is based on samples taken from Cardinia Creek near Melbourne.

W.D. WILLIAMS,
Department of Zoology,
University of Adelaide,
ADELAIDE, South Australia. 5001.

4. ATTENUATION OF LIGHT IN NATURAL WATERS

The mechanisms by which photosynthetically active radiation (PAR) is attenuated, and procedures by which this attenuation may be studied in natural waters are discussed.

What happens to light within a natural water body depends on the characteristics of the light field itself (spectral composition, irradiance, radiance distribution etc.), and also on the inherent optical properties of the water (absorption coefficient, scattering coefficient etc.). The essential concepts will be defined and

ATTENUATION OF LIGHT IN NATURAL WATERS (continued)

explained. Most of the attenuation of light within water bodies is due to absorption and the radiation by the water itself, by dissolved colouring matter (gelbstoff) and by phytoplankton. Attenuation is intensified, sometimes several-fold, by scattering of the light by the pathlength the photons must follow in traversing a given depth.

The intensity of PAR diminishes with depth in an approximately exponential manner. This enables us to characterize the attenuation properties of the water in terms of a single parameter - the vertical attenuation coefficient. The measurement of this parameter with a submersible quanta meter will be discussed. The contribution that the different absorbing and scattering components of the system (water, gelbstoff, phytoplankton, turbidity) make to the observed attenuation will be considered.

J.T.O. KIRK,
CSIRO Division of Plant Industry,
Box 1600, P.O.,
CANBERRA CITY, A.C.T. 2601.

5. TOWARDS A GENETIC CONCEPT OF SPECIES FOR THE DESMIDIACEAE

A discursive look at desmid systematics in particular, other freshwater algae in general with some comments on alpha taxonomy and classical aquatic sites.

P. TYLER,
Botany Department,
University of Tasmania,
HOBART, Tasmania. 7001.

6. VICTORIAN FISHERIES

Abstract not available.

J.H. WHARTON,
Division of Fisheries,
MELBOURNE, Victoria. 3000.

7. COMMERCIAL FISHING IN THE RIVER MURRAY - THE EFFECT OF INTRODUCED SPECIES AND ENVIRONMENTAL ALTERATIONS

Commercial freshwater fishing in South Australia is briefly described. Changes in the abundance of certain species can tentatively be explained by -
a. effects of competition from introduced species, and
b. environmental changes, particularly water level variation.
In general the native species are being disadvantaged by environmental alterations and the tench, a long-established immigrant, by competition with European carp.

L.F. REYNOLDS,
Fisheries Branch,
Department of Agriculture & Fisheries,
ADELAIDE, South Australia. 5000.

8. LIMNOLOGICAL STUDIES OF THE LAKE HUME AND ALBURY-WODONGA AREA

To aid future monitoring base line limnological data was obtained for Lake Hume and the waters likely to be affected by the development at Albury-Wodonga. Salinities were low with ionic dominance: Na, Mg, Ca, K. HCO_3, Cl, SO_4. Turbidities were 1.2-14 N.T.U., total phosphorus was 5-60 mg/m^3 and inorganic nitrogen was <20-170 mg/m^3. Surface temperatures ranged from 8.9°C to 20.4°C and the lake stratified during December to April. Eighty percent of the phytoplankton biomass was the genera Melosira.

R. CROOME,
Engineering & Water Supply Department,
Bolivar Laboratories,
ADELAIDE, South Australia. 5000.

9. LONG TERM SALINITY SIMULATION IN THE RIVER MURRAY

A computer model was used to investigate the effects on River Murray salinity of various salinity control schemes. The model uses average monthly flows and salinities at Lock 9 and predicts the changes in salinity at markers as they travel down river to Morgan.

A. CLOSE,
Engineering & Water Supply Department,
State Administration Centre,
Victoria Square,
ADELAIDE, South Australia. 5000.

10. REPORT ON THE FIRST STAGE OF THE INVERTEBRATE SURVEY OF DARTMOUTH DAM AREA

A brief report is given of the survey of the invertebrate fauna of the inundation area, catchment and downstream section of the Mitta Mitta River of the Dartmouth Dam. Findings of special interest are mentioned, results of quantitative aquatic sampling downstream of the Dam are given, and speculation is offered of the possible effects of the Dam on the invertebrate fauna of the Mitta Mitta River Valley.

B.J. SMITH,
National Museum of Victoria,
Russell Street,
MELBOURNE, Victoria. 3000.

11. FISH INTERACTION AND PREDATION EXPERIMENTS IN WHOLE LAKE ECOSYSTEMS

Space and food resource sharing between cut throat trout *(Salmo clarki)* and dolly varden *(Salvelinus malma)* are studied in allopatric and sympatric lake populations, in laboratory experiments and in experimental introductions to a series of previously fishless lakes. Impacts of predation by these and other vertebrates on the zooplankton community of the lakes are also examined.

T. NORTHCOTE,
University of British Columbia,
Vancouver, B.C.

12. A SURVEY OF THE FRESHWATER FISHES OF NEW SOUTH WALES

In this paper a joint survey of the freshwater fishes of New South Wales presently being carried out by New South Wales State Fisheries and the Australian Museum as part of the Australian Biological Resources Study is outlined. Co-operation from other workers collecting in the south-eastern Australian region is solicited.

D.A. POLLARD,
N.S.W. State Fisheries,
211 Kent Street,
SYDNEY, N.S.W. 2000.

13. MASSIVE FISH KILLS IN LAKE EYRE 1975

The massive fish kill which occurred in Lake Eyre during 1975 is outlined and a series of slides show the extent of this kill.

N. RUELLO,
N.S.W. State Fisheries,
211 Kent Street,
SYDNEY, N.S.W. 2000.

14. OXYGEN ENRICHMENT OF ARTESIAN WATERS IN CENTRAL AUSTRALIA

Preliminary data suggests that photosynthetic oxygenation of artesian surface waters may offset oxygen depletions induced by climatic and other factors so as to ensure effective respiratory refuges for certain central Australian fishes. These would otherwise be subject to periodically and temporarily excessive respiratory stress.

J. GLOVER,
S.A. Museum,
North Terrace,
ADELAIDE, South Australia. 5000.

15. THE REPRODUCTIVE HOMING BEHAVIOUR OF BROWN TROUT *(Salmo trutta* L.) IN LAKE EUCUMBENE N.S.W. WITH ESPECIAL REFERENCE TO ORIENTATION BY PHEROMONES

During the 1968 winter 1342 spawning brown trout of lake origin were trapped, tagged and released back in to Swamp Creek, a tributary of the Eucumbene River. Tag returns from the amateur fishery showed these to become evenly distributed throughout the lake. Their homing behaviour was demonstrated when 368 returned to spawn in 1969 and 142 in 1970. Estimates for tag-loss, natural and angling mortalities, and percentage maturation per age-group are used to calculate percentage return in 1969 and 1970. A further 1745 fish were tagged in 1970 but only 54 were observed to return in 1971. Swamp Creek was poisoned with rotenone just prior to the 1971 spawning run and it is postulated that the presence of resident stream fish constitutes a major homing stimulus for returning adults, with the poor return of 1970 fish in 1971 being attributable to the absence of such residents. The possible role of rotenone is discussed.

R.D.J. TILZEY,
N.S.W. State Fisheries,
211 Kent Street,
SYDNEY, N.S.W. 2000.

16. AUSTRALIA's *Cyprinus carpio* - WHICH ONE FROM WHERE?

Several sub-species of carp are recognised overseas. It appears that three sub-species were independently brought into Australia. Differences in the ecology of these three sub-species may be partially explained by understanding their origin.

K. SHEARER,
Inland Fisheries Research Station,
NARRANDERA, N.S.W. 2700.

JOLLY AWARD

I ..... hereby nominate

..... for the 1976-77

JOLLY AWARD.

Proposer .....

Seconder .....

Date .....

Send completed form to -

Dr. R.T. Buckney,
Department of Zoology,
G.P.O. Box 498,
ADELAIDE, S.A. 5001.